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## CRATE FOR 20-24 OZ. BOTTLES

[0001] This invention relates to crate constructions for bottles and more specifically, to a low depth crate for 20-24 oz. bottles.

### BACKGROUND OF THE INVENTION

[0002] Low depth bottle crates are well known in the art as exemplified by U.S. Patent Nos. 4,700,836; 4,928,841; 5,060,819; and 5,855,277. These crates typically have side and end walls that extend only about one-third the height of standard two-liter bottles. This means that, when loaded and stacked, crates rest directly on the bottles in an underlying crate. The low depth of the crate is attractive, however, since it reduces material costs, enhances visibility of the bottles, and reduces shipping space when the crates are stacked empty. Some prior crates employ crate height increasing features to provide greater support for bottles received therein, while still permitting the bottle labels to be seen. Such features may include columns that extend above the side and end walls of the crate as exemplified in U.S. Patent Nos. 4,899,874; 4,978,002; and 5,501,352.

### BRIEF SUMMARY OF THE INVENTION

[0003] The crate of this invention includes a peripheral wall (inclusive of side and end walls) of uniform height with substantially U-shaped cut-outs spaced along the side and end walls of the crate. The cut-outs extend from the upper edge of the peripheral wall downwardly to a ledge or shelf that separates the

peripheral wall into upper and lower portions. These cut-outs in the upper portion of the side and end walls may also be viewed as defining columns or pillars in the upper portion of the side walls, end walls and corners, between the cut-outs. The lower portion is solid about the periphery of the crate with the exception of two cut-outs in the end walls extending from the crate bottom upwardly to respective handle bars that are flush with the top surface of the peripheral wall. As such, the handle bars interrupt the otherwise regular occurrence of the cut-outs in the upper portion of the peripheral wall.

[0004] The interior of the crate is open, i.e., there are no partitions, columns or other interior structures defining compartments for one or more bottles. Thus, the crate bottom, a grid-like structure described in detail further below, has a flat upper surface throughout the crate interior, but with defined bottle support platforms arranged in four rows of six, that are flush with the upper surface, each platform including a solid annular ring. Thus, the crate is designed to carry twenty-four individual 20-24 oz. bottles.

[0005] The peripheral wall is generally of single thickness construction with the exception of certain areas at the tops of the columns and the handle bars that are of double thickness as described below.

[0006] The interior of the lower portion of the peripheral wall is joined to the crate bottom directly below respective cut-outs in the upper peripheral wall portion by three vertical, inwardly projecting ribs. The

two outside ribs of each group of three ribs merge with edge surfaces of adjacent columns. The upper (approximate) 1/3 of the columns are of double thickness, forming a closed "cap" on the top of each column. For the columns along the side and end walls, an internal support buttress extends from the lower edge of the cap downwardly and at an acute angle relative to vertical, joining with the crate bottom well inwardly of the lower portion of the peripheral wall and the three vertical ribs between adjacent columns. Since the bottle support platforms are generally aligned with the cut-outs, the buttresses extend partially between adjacent support platforms and thus provide some support for individual bottles located along the side and end walls of the crate. The corner columns are generally similar, but do not include the internal buttresses.

[0007] The handle bars are also of double thickness and extend between a pair of columns in the respective end walls. A support strut and pedestal arrangement connects the center of each handle bar directly to the crate bottom.

[0008] The lower surface of the crate bottom is formed with recesses aligned with the bottle support platforms on the upper surface, thus providing defined spaces for the caps of bottles in an underlying crate when similar filled crates are stacked. The recesses each have a flat base area that is larger than a respective bottle cap, but the recesses are not all of the same configuration. Rather, there is a symmetrical array of partially circular recesses.

[0009] Specifically, the lower surface of the crate bottom is arranged in four quadrants, each a mirror image of the adjacent quadrants along the longitudinal and transverse axes. Within each quadrant, the undersides of the six bottle supporting platforms is different in terms of rib height, but similar in terms of overall grid configuration. Annular ribs depending from each bottle supporting platform generally have a maximum rib height that coincides with the bottom surfaces of the grid that engage a supporting surface. In the instant invention, the annular ribs are formed to have some circumferential portion reduced in height so as to be contiguous or flush with reduced height ribs both inside and outside the annular ribs thereby providing additional selectively oriented spaces for the bottle caps to slide in an uninhibited manner. This arrangement facilitates dragging of an upper, filled crate off a lower filled crate when stacked.

[0010] More specifically, the height of the annular rib defining one recess (adjacent one side wall and the transverse axis of the crate) is decreased through an angle of slightly more than  $90^\circ$  along a portion facing the nearest side wall, thus permitting a respective bottle cap to slide across rib and laterally toward the nearest side wall.

[0011] The next adjacent recess along the side wall in the direction of the nearest end wall is defined by an annular rib that is decreased in height through approximately  $180^\circ$  along portions facing the nearest side and end walls, such that the bottle cap is free to move

transversely toward that side wall, and longitudinally toward but not into the next adjacent recess.

[0012] The next adjacent recess in the nearest corner of the crate is defined by a rib that is decreased in height through about 200° also along portions facing the nearest side and end walls. A respective bottle cap is thus free to move transversely toward side the nearest wall and longitudinally toward the nearest end wall.

[0013] The above described recesses lie in one row of one quadrant, extending from the transverse axis along the side wall to an end wall. The second row of the quadrant extending from the transverse axis to the same end wall but along the longitudinal axis (and adjacent the first row in the longitudinal direction) has recesses that are generally similar to adjacent recesses in the first row, but with slight differences in the angles through which the reduced height annular ribs extend as dictated by the grid pattern of the crate bottom.

[0014] The overall symmetrical pattern of recesses generally centers one filled crate atop another, but allows movement of underlying bottle caps within defined areas and thus facilitates the dragging of one filled crate off another filled crate.

[0015] Accordingly, in one aspect, the invention relates to a low depth bottle crate having a peripheral wall of uniform height, the peripheral wall including a pair of side walls and a pair of end walls; a crate bottom connected to the peripheral wall, an upper surface

of the crate bottom formed to include a bottle supporting platform for each bottle to be received in the crate; a plurality of substantially U-shaped cut-outs in upper portions of the side and end walls defining columns between the cut-outs, lower portions of the peripheral wall and the columns being of single wall construction except for hollow caps at upper ends of the columns that are of double wall construction; each of the columns, except for four corner columns, having a support buttress extending downwardly and inwardly from a lower edge of a respective one of the hollow caps to the crate bottom, and wherein the cut-outs terminate at a ledge that separates the upper portions of the side and end walls from the lower portions of the side and end walls, and further wherein the lower portions of the side and end walls are connected to the crate bottom by a plurality of inwardly directed ribs arranged in groups, directly below each cut-out.

[0016] In another aspect, the invention relates to a low depth bottle crate having a peripheral wall of uniform height, said peripheral wall including a pair of side walls and a pair of end walls; a crate bottom connected to said peripheral wall, an upper surface of the crate bottom formed to include a bottle supporting platform for each bottle to be received in the crate; a plurality of substantially U-shaped cut-outs in upper portions of the side and end walls defining columns between the cut-outs, the cut-outs terminating at a ledge that separates the upper portions of the side and end walls from lower portions of the side and end walls, and wherein handle cut-outs are provided in lower portions of

the end walls, defining handle bars that extend between adjacent columns in the end walls directly above the handle cut-outs, each handle bar connected directly to the crate bottom at a mid-point of the handle bar.

[0017] In still another aspect, the invention relates to a low depth bottle crate having a peripheral wall of uniform height, the peripheral wall including a pair of side walls and a pair of end walls; a crate bottom connected to the peripheral wall, an upper surface of the crate bottom formed to include a bottle supporting platform for each bottle to be received in the crate; a plurality of substantially U-shaped cut-outs in upper portions of the side and end walls defining columns between the cut-outs, lower portions of the peripheral wall and the columns being of single wall construction except for hollow caps at upper ends of the columns that are of double wall construction; wherein handle cut-outs are provided in lower portions of the end walls, and handle bars extend between adjacent columns in the end walls directly above the handle cut-outs, each handle bar connected directly to the crate bottom; and the crate bottom having a lower surface formed with an array of recesses adapted to engage bottle caps of bottles carried in an underlying similar crate, the recesses in each of four quadrants being individually different but substantial mirror images of recesses in adjacent quadrants in respective longitudinal and transverse directions.

# BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIGURE 1 is a perspective view of the crate in accordance with the invention;

[0019] FIGURE 2 is a right side elevation view of the crate shown in Figure 1;

[0020] FIGURE 3 is a right end view of the crate shown in Figure 1;

[0021] FIGURE 4 is a top plan view of the crate in Figure 1;

[0022] FIGURE 5 is a bottom plan view of the crate shown in Figure 1;

[0023] FIGURE 6 is a section taken along the line 6-6 of Figure 4;

[0024] FIGURE 7 is a section taken along the line 7-7 of Figure 4;

[0025] FIGURE 8 is a section taken along the line 8-8 of Figure 5; and

[0026] FIGURE 9 is a partial bottom perspective view of one quadrant of the crate shown in Figures 1-5.

## DETAILED DESCRIPTION OF THE INVENTION

[0027] With reference initially to Figures 1-5, the crate 10 in the exemplary embodiment is a one-piece



molded plastic construction and has a peripheral wall 12 that includes a pair of side walls 14, 16 and a pair of end walls 18, 20. The peripheral wall 12 is of uniform height, extending from a crate bottom 22 to an intermittent or discontinuous top surface 24. The latter is created by a series of U-shaped cut-outs 26 that are spaced about the peripheral wall, with six such cut-outs in each of the respective side walls 14, 16 and two in each of the respective end walls 18, 20. The cut-outs 26 reduce the weight of the crate and also provide good visibility with respect to labels on individual bottles in the crate. In this regard, the cut-outs 26 are centered on individual bottle support platforms formed in the crate bottom, with two mutually perpendicular cut-outs for the support platforms in the corners of the crate. Each cut-out in the side and end walls has a pair of inclined, substantially straight sides 28, 30 that extend downwardly from the discontinuous top surface 24 to a shelf or ledge 32 that separates the peripheral wall into upper and lower portions. The lower portion is solid about the periphery of the crate, with interruptions only in the end walls where handle cut-outs 34 extend from the crate bottom 22 upwardly to handle bars 36 that allow the crate to be grasped at opposite ends.

[0028] The cut-outs 26 may also be said to define a plurality of columns or pillars 38 along the side walls and 38' along the end walls that extend upwardly from the shelf or ledge 32, terminating at the top surface 24 of the peripheral wall. In the exemplary embodiment, there are five columns 38 along each side wall, two columns 38' along each end wall, and one column 40 in each of the

four corners of the crate. With exceptions explained below relating to the end wall and corner columns 38', 40, respectively, the structure of all of the columns 38, 38' and 40 is substantially identical, and therefore, only one need be described in detail. Thus, with particular reference to Figures 1, 4, 6 and 7, each column 38 is of generally single wall construction. The upper portion of the column is formed as a hollow cap 42 by making approximately the upper one third of the column of double thickness, with top surface 24 connecting the outer surface of the column to an inner surface 44. From the lower edge 46 of the inner surface 44, a support buttress 48 extends downwardly and inwardly at an acute angle to the column. An inward step 50 and a rib 52 that runs the length of the buttress, provide added strength. Two additional ribs 54, 56 on the inner surface 44 of the hollow cap strengthen the cap but also face toward, and provide support for, bottles on adjacent support platforms. Note also that side edges 58, 60 of the columns 40 wrap around the shelf or ledge 34 to provide additional stiffness to the columns.

[0029] With reference especially to Figures 1 and 2, wedge "slides" 62 are provided in alternating columns along the side walls. These "slides" bridge the upper and lower portions of the side walls, essentially eliminating the ledge 32 at these locations, and thus providing a smooth transition between the upper and lower portions of the side walls. This arrangement allows one crate side wall to slide down an underlying crate side wall without interference from ledge 24, when individual crates are removed from a stack of similar crates.

[0030] Between each pair of adjacent columns 38 (and between respective corner and end wall columns 40, 38'), the lower portions of the side walls 14, 16 and end walls 18, 20 are connected to the crate bottom 22 by groups of three laterally spaced, substantially L-shaped ribs 64, 66 and 68, extending between the shelf or ledge 32 and the crate bottom 22. The "outside" ribs 64 and 68 merge with respective edges 58, 60 of the adjacent columns, as best seen in Figures 1 and 7. This generally open arrangement of ribs along the interface of the peripheral wall and crate bottom facilitates drainage but also provides the required strength with reduced amounts of plastic material.

[0031] The columns 40 that are in the four corners of the crate do not have support buttresses, and have only a single rib 70 on an inner surface 72 of the respective hollow caps, as best seen in Figure 1. The columns 38' that are formed in the end walls 18, 20 do have support buttresses 48 but have only one side edge 60, the other side edge removed to accommodate the end wall handle cut-outs 34 and handle bars 36. Note that the handle bars 36 extend between and are flush with the top surface 24 of the crate as defined by the hollow caps 42' of the end wall columns 38'. A reinforcement or support strut 74 extends downwardly from the middle of each handle bar 36 to an upwardly projecting, substantially hollow pedestal 76 that is integral with the crate bottom 22. The combination of the strut 74 and pedestal 76 provides stiffness and strength to the handles and to the crate end walls.

[0032] The interior of the crate is open in that there are no partitions or other internal structures that might otherwise serve to divide the crate interior into bottle receiving pockets or compartments. The crate bottom 22 is a grid like structure comprised of longitudinal, transverse and diagonal ribs along with solid annular rings as described further below. The upper surface of the crate bottom is flat and smooth across substantially the entire interior of the crate, save where the buttresses 48 join with the outer periphery of the crate bottom, well inwardly of the respective groups of three substantially L-shaped ribs 64, 66 and 68. The flat grid structure nevertheless defines bottle receiving platforms that include solid, outer annular rings 78 that are engaged by respective bottles. The rings 78 are connected by a regular array of longitudinal, transverse, and diagonal ribs 80, 82 and 84, respectively, that create a generally open bottom that also prevent liquids and small debris from collecting in the crate. These ribs extend through the outer annular rings 78 and converge at an inner annular ring 86 at the center of each platform. At the center of each group of four surrounding platforms, certain of the ribs 80, 82 and 84 converge at drainage holes 88 or 90. All of the diagonal ribs are radially oriented relative to the center rings 86 of the various platforms.

[0033] In the exemplary embodiment, the crate bottom is formed to include four longitudinal rows with six platforms in each row. Thus, the crate is designed to carry 24 bottles, individually or in six pack carriers. Note, however, that if six pack carriers are utilized,

they cannot be of the conventional cardboard type that have side and end walls connected to a carrier bottom. Such traditional six pack carriers will not fit in the exemplary crate due to the inwardly projecting buttresses 50. Shrink wrap carriers of the type that attach only to the upper portions of the bottles may be used, however, and the buttresses 50 can thus extend between lower portions of adjacent bottles, unencumbered by any carrier surface.

[0034] With specific reference to Figures 5, 8 and 9, the lower surface of the crate bottom 22 can be viewed as divided into four quadrants, each a mirror image of the adjacent quadrants along both the longitudinal and transverse axes. Within each quadrant, the undersides of the six bottle supporting platforms are different in terms of rib height, but similar in terms of overall configuration. Maximum rib height coincides with the bottom surfaces of the grid that engage a supporting surface and that define recessed areas that are designed to receive bottle caps of bottles in an underlying crate when stacked. In other words, with the exception of the recessed areas, most of the ribs in the grid are substantially of maximum height. Thus, if the outer annular ribs 92 (that depend from the underside of the radially outer edge of outer rings 78 that form the support platforms on the upper surface of the crate bottom) were of maximum height about a full 360°, and if the ribs within each ring were of lesser height, the bottle caps would be confined within circular recesses bounded by the outer annular ribs 92. In the instant invention, however, the outer annular ribs 92 are formed

to have some circumferential portion reduced in height so as to be contiguous with reduced height ribs inside the annular ribs 92, as well as selected of the ribs 80, 82, 84 beyond or outside the annular ribs, thereby providing additional selectively oriented spaces for the bottle caps to slide in an uninhibited manner. The overall pattern in the four mirror image quadrants, however, serves to generally center one filled crate atop another filled crate, but also facilitates dragging of an upper filled crate off a lower filled crate.

[0035] Specifically, and with reference to Figure 9, one quadrant of the undersurface of the crate is shown. For convenience, the bottle cap receiving areas defined in part by annular ribs 92 are designated A, B, C, D, E and F. For ease of understanding, the periphery of each recessed area has been drawn with darker lines. The height of rib 92 in area A in the first row of the quadrant is decreased through an angle of slightly more than 90° as indicated by the arrow 94 in an area adjacent the side wall 14. Thus, annular rib 92 between portions 96, 98 of one of the longitudinal ribs 80 is the same height as the ribs 80, 82 and 84 inside the annular rib 92 and the same height as the bottom surfaces of ribs 64, 66 and 68, thus permitting a bottle cap to slide across rib 92 and laterally toward (and beyond) the side wall 14 within this open area. Note in this regard that ribs 64, 66 and 68 in all cases are of reduced height and thus do not engage any supporting surface.

[0036] For platform B, the annular rib 92 is decreased in height through approximately 180° as indicated by

arrow 96, such that the bottle cap is free to move transversely toward (and beyond) the side wall 14 and longitudinally toward (but not into) the next adjacent area C.

[0037] For platform C, the annular rib 92 is decreased in height through about 200° as indicated by arrow 98, and is thus free to move transversely toward (and beyond) side wall 14 and longitudinally toward (and beyond) the end wall 20.

[0038] Receiving area D in the second row of the quadrant is generally similar to receiving area A but lies inboard, adjacent the longitudinal axis. The annular rib 92 has a reduced height through about an 85° angle indicated by arrow 100. The bottle cap is confined, however, by longitudinal rib 80 running the two rows of the quadrant in the longitudinal direction.

[0039] Area E is generally similar to adjacent area B, but also lies inboard, adjacent the longitudinal axis of the crate. The annular rib 92 is reduced in height through about 180°, as indicated by arrow 102, with the open area generally facing diagonally toward area C. Within the 180° area, the bottle cap is free to move beyond rib 92 in both longitudinal and transverse directions, but confined by longitudinal and transverse ribs 80, 82 between adjacent recesses.

[0040] Area F is similar to adjacent area C, with rib 92 reduced through about 200° as indicated by arrow 104. Area F is thus open in the longitudinal direction toward

the nearest handle opening 34, and open in the transverse direction to the longitudinal rib 80 between the first and second rows of the quadrant, and open into the corner area.

[0041] In all cases, the reduction in height of the annular ribs 92, or other ribs that confine the bottle caps, is achieved through a taper as opposed to a sharp shoulder. This further enhances the capability of an upper crate to slide across a lower crate.

[0042] When empty, the crates 10 are nestable, with the columns of an underlying crate extending upwardly through spaces in the crate bottom below the columns in the overlying crate. Referring to Figures 5 and 6, vertically extending, transversely oriented ribs 106 are engaged between the inner surfaces of the columns 38 and the inner surfaces of the buttresses 48, and extend below the hollow caps 42, 42', terminating at edges 108. Ribs 106 are bisected by vertically extending, longitudinally oriented ribs 110 that extend just beyond edges 108 of the ribs 106, terminating at edges 112. The top surfaces 24 of underlying columns will thus engage edges 108 between ribs 110 and the inside surface of the buttresses 48 when stacked empty. Similar nesting ribs are provided in the end columns 38. Corner columns 40 are provided with single, radially oriented nesting ribs 112 that extend between the hollow caps and corner surfaces, with edges 114 at the same height as edges 108 to thereby engage corner columns of an underlying crate.



Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	